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(56) Documents cited
GB 2234797 A GB 1462107 A GB 0997003 A
GB 0770363 A GB 0703034 A GB 0679650 A
GB 0618033 A GB 0603984 A GB 0512543 A
GB 0491426 A

(58) Field of search
UK CL (Edition L) F2H HARP HARX HASS HASX HKX HL
INT CL[5] F16B 19/10, H01R 33/46
Online databases: EDOC

(54) Connection of tubular members in holes

(57) The tubular stem 1 of a portable lamp is fixed in a hole formed in a base 2 by folding outwardly the tabs formed by slitting one end of the stem 1, the stem 1 being provided with a shoulder. The hole in the base 2 may be non-circular in section. The shoulder on the stem 1 may be formed by an annular bend on the stem or by punching out portions of the end of the stem 1. The base 2 may be recessed to receive the shoulder on the stem 1. A support plate may be provided between the upper part of the base 2. A further sleeve may surround the stem 1.

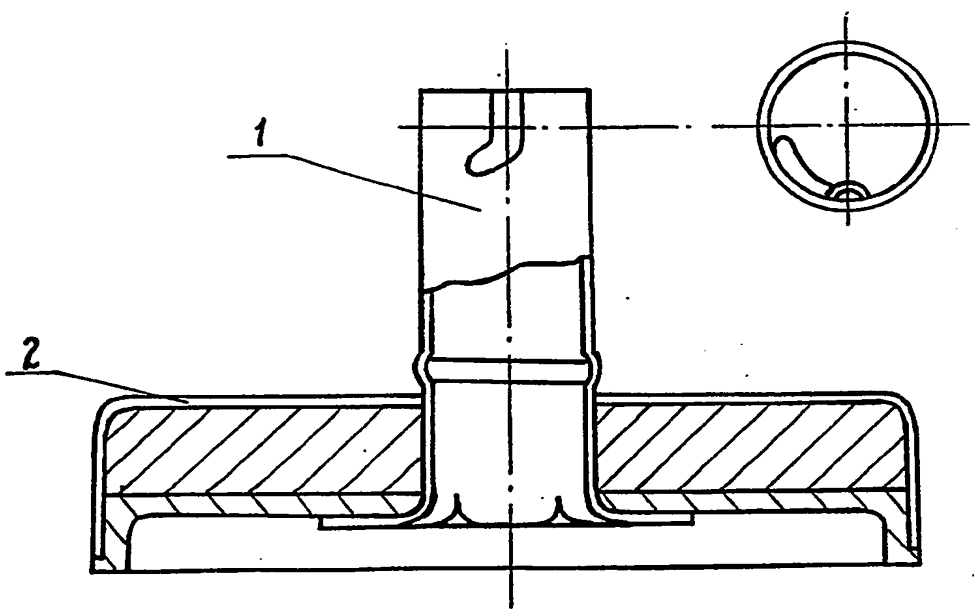

Fig. 3

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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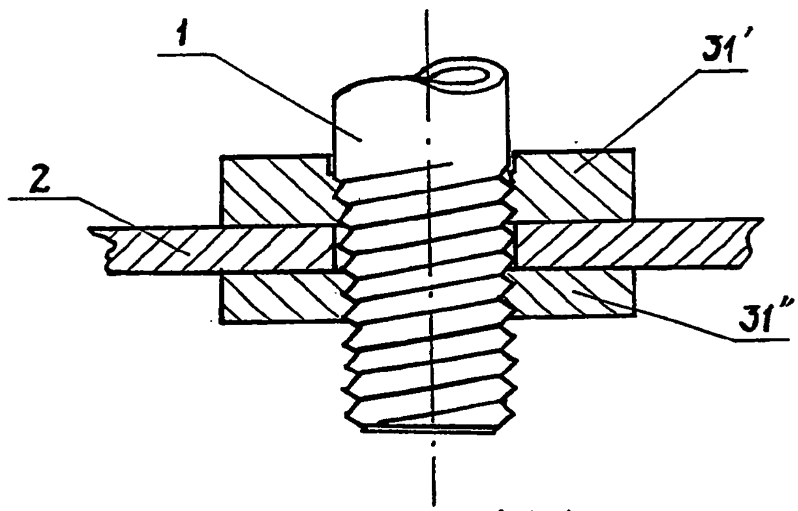

Fig. 1 (a)

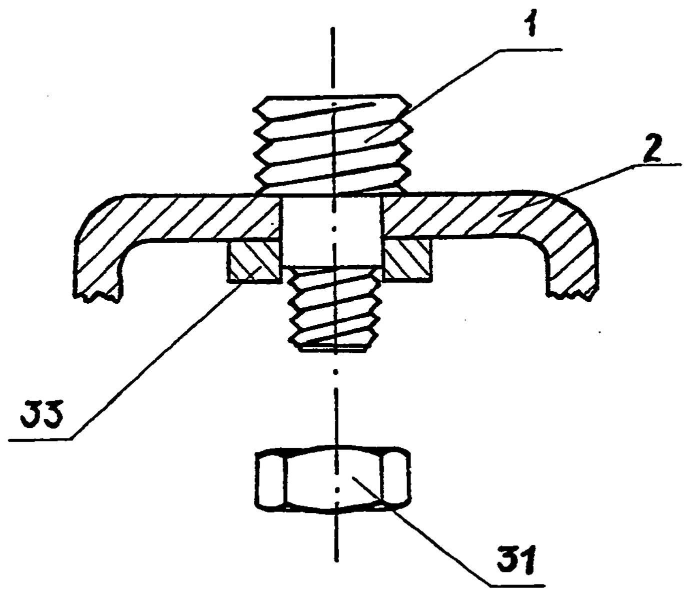

Fig. 1 (b)

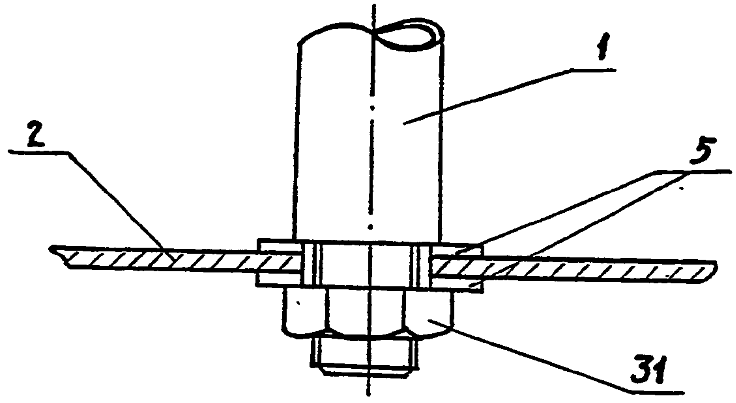

Fig. 2

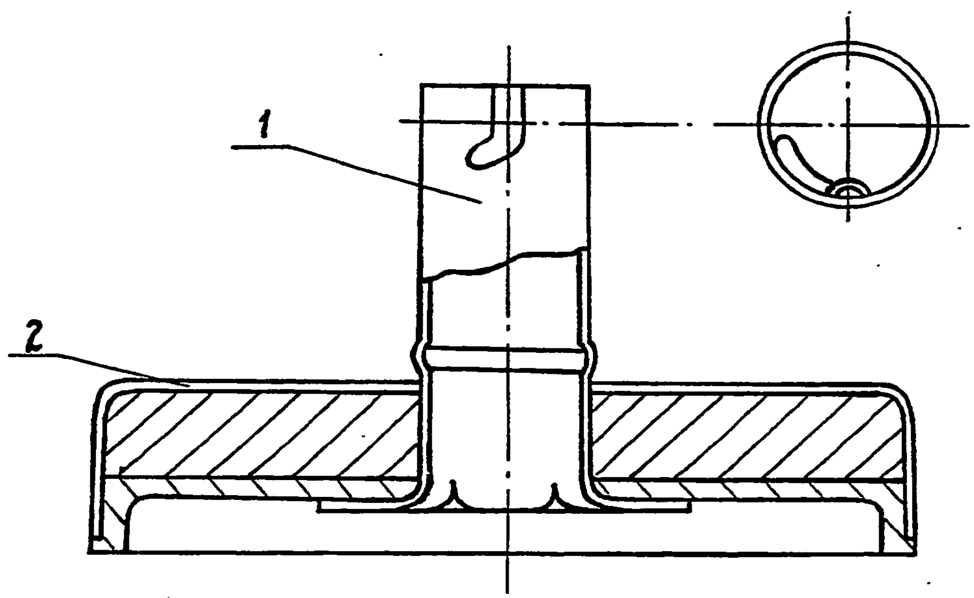

Fig. 3

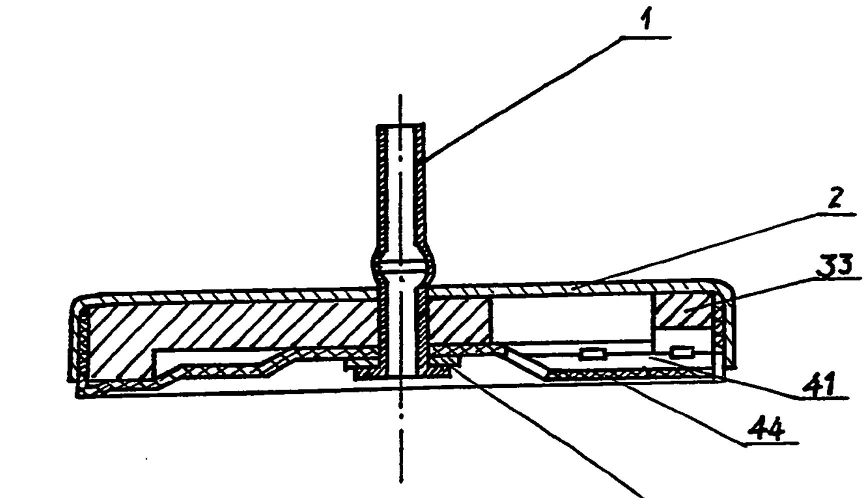

Fig. 4

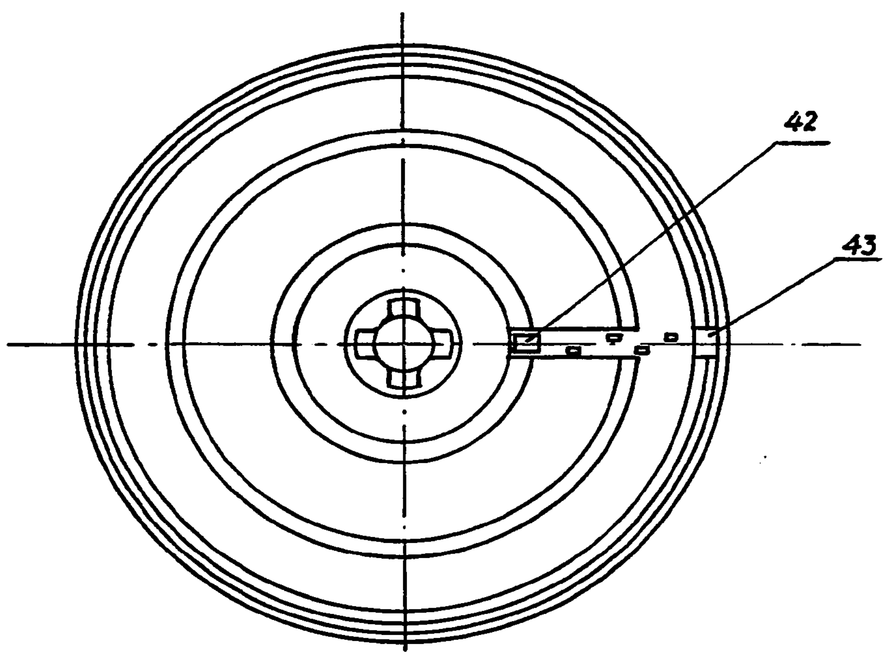

Fig. 5

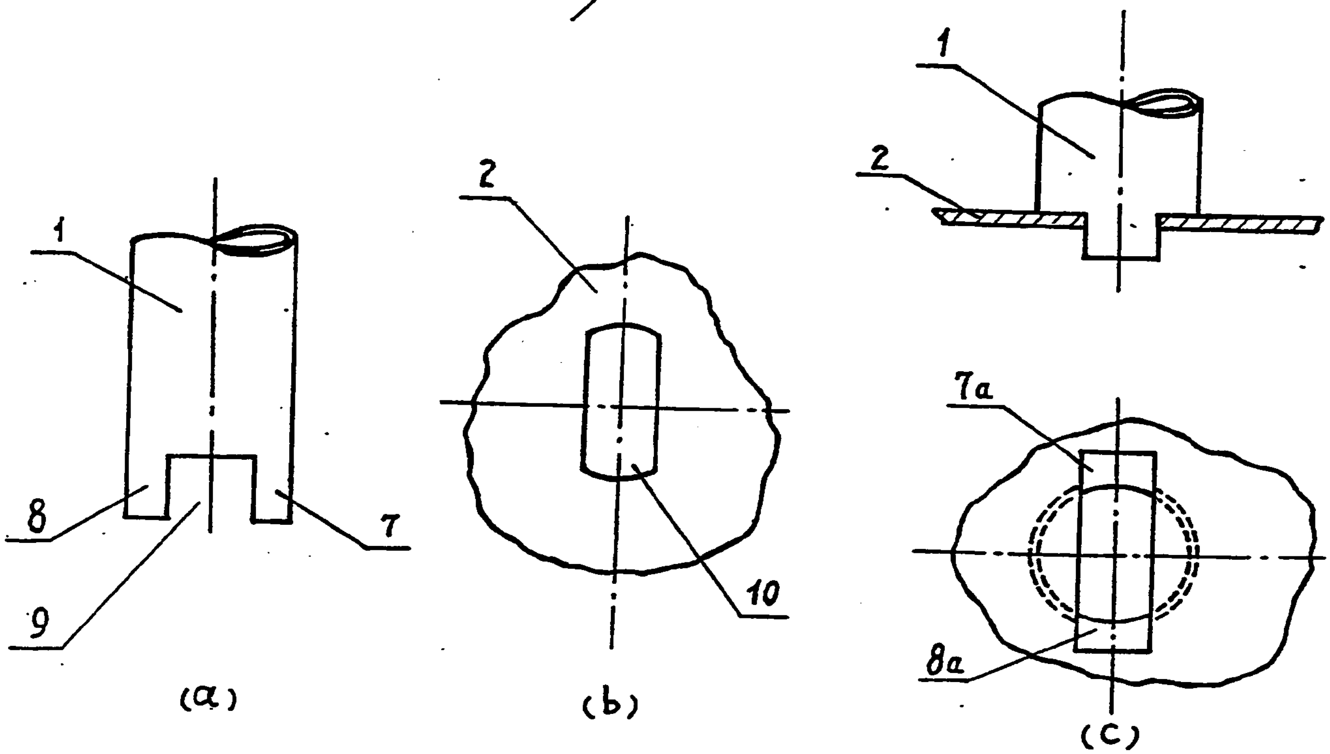

Fig 6

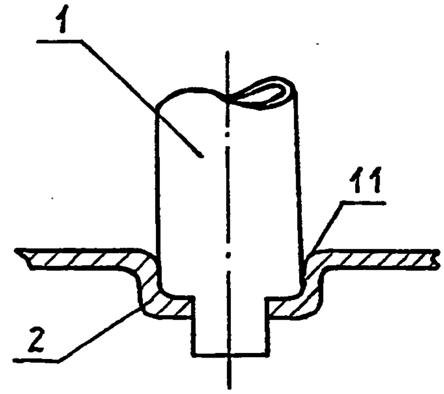

Fig. 7

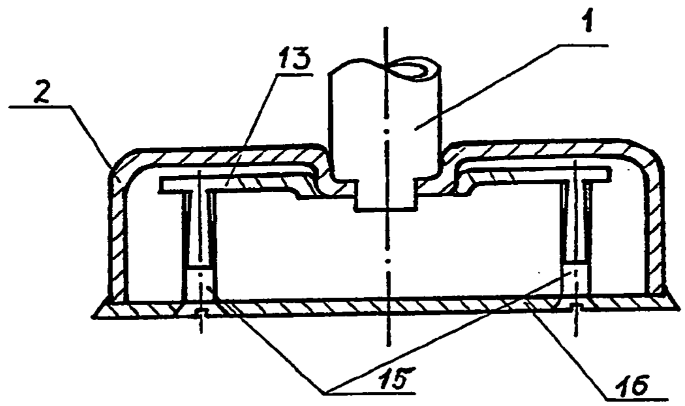

Fig. 8

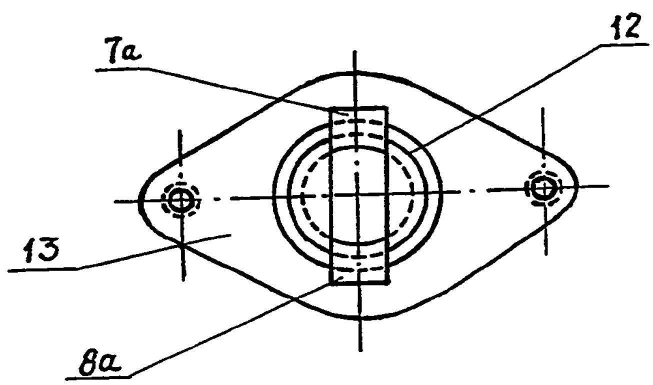

Fig. 9

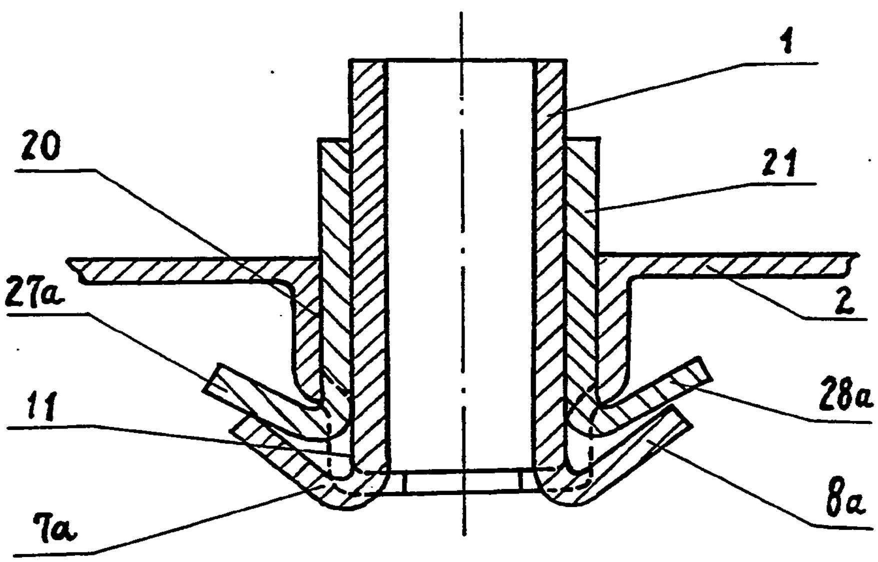

Fig. 10

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A Connecting Assembly for Fixing the Tubular Stem/Stud of A Portable Lamp to the Base of the Same

Background of Invention

The present invention relates to a connecting assembly for fixing the tubular stem/stud of a portable lamp to the base of the same.

In the prior art, connection between said stem/stud and said base is by means of screw thread and nut(s). Refer to Fig 1 (a) and (b). Fig. 1 (a) shows a stem/stud (1) which has a threaded lower portion; said lower portion is screwed into a first nut (31') with a countersink in the top, and then inserted through a hole in a base (2), and is further fixed tight by a second nut (31"). Fig. 1 (b) shows an improvement over the above structure, where the stem/stud (1) is necked to form a shoulder, in order to save the first nut. The threaded portion of said stem/stud (1) is inserted through holes made in a base (2) and a weight block (33), before a nut (31) is screwed to fix all parts together. Nevertheless, such structures are all related to threaded connection.

Following are some of the shortcomings of the prior art structures, as mentioned above.

First, as is common knowledge, a threading procedure reduces the mechanical strength of a tube; as a remedy, pipe wall thickness has to be increased, which in turn will increase the cost. And in case a necking

procedure is adopted, the pipe inside diameter is reduced. Besides, a necking procedure can not produce a right angle shoulder for butting, which may result in a bad perpendicular of the assembly.

Secondly, a screw nut is not only easy to get loose, but also has an axial dimension much bigger as compared with the wall thickness of a pipe. If anti-loose means is used, the total axial height of said nut and said means would be even bigger; moreover, use of anti-loose means makes assembly more complicated. To prevent said screw nut from getting loose, sometimes it is welded to the end of said threaded portion of the stem/stud. Even so, the connecting stem/stud can still turn in the base hole because of sliding fit, if proper anti-loose means is not adopted.

Thirdly, after threading, the stem/stud usually has to be painted or plated. Since usually fine thread is used, let alone painting, even after plating, most stems/studs can no longer mate with the nut, as they could before. As known, a painting layer is much thicker than a plating layer. So during the painting procedure, even if only one drop of paint drops onto the threaded portion of the stem/stud, the result would be that the nut can no longer be screwed in.

Fourthly, threading procedures are expensive; and the requirement for raw material (the tube) to go through a threading procedure is also high, for the pipe diameter must be within a close tolerance, and the welding seam should be of the same strength as that of the tube.

Fifthly, in case of standard lamps, very often the user has to screw the tube stem to the base by himself, in which case the power supply cord located inside said stem/stud tube is often seriously wrung after assembly. One way to cope with this problem is to arrange the cord outside said tube stem/stud; another is to raise the base a bit higher by adding several legs to it, so that the power supply cord can run under the base into the tube. In both above cases, the cord is not running into the base at a fixed location. Besides, when the cord is made to run outside the stem tube, the lamp becomes bad-looking in appearance, and will easily be tipped over if someone stumbles over the cord. If, on the other hand, legs are added to raise the base, to allow the cord to run beneath it, the cord which is usually in touch with the floor is apt to get worn when the lamp

is moved here and there. Besides, raising the base to leave room for a cord to run means a higher centre of gravity; and adding legs to the base will reduce the bottom area between base and floor (for instance, from a circle to an inscribed triangle if three legs are added). All these will result in that the lamp is much easier to be tipped over.

Sixthly, thread connection is not fit for use of pipes other than round ones. This largely limits the scope of raw materials.

Objects of Invention

The primary object of the present invention is to provide a kind of connecting assembly for fixing the tube stem/stud of a portable lamp to its base, which connecting assembly is free of all the above shortcomings in the prior art, easy to manufacture at a low cost, and more reliable and rigid;

Another object of the present invention is to provide a connecting assembly, which consists of the least number of composing parts, and can make use of a wide range of raw materials, including seamed pipes, pipes of either metric system or inch system, and also pipes which do not require a close manufacturing tolerance.

Brief Description of Drawings

The above-mentioned objects, as well as other advantages of the present invention, will become clear by the following detailed description of several preferred embodiments of the present invention, with reference to the accompanying drawings, wherein:

Fig. 1 (a) illustrates a connecting assembly comprising a stem/stud having a threaded lower portion, and two nuts at both sides of a base;

Fig. 1 (b) shows a connecting assembly comprising a stem/stud having a necked portion and only one nut to tighten the same to a base;

Fig. 2 shows a prior art connecting structure comprising a necked stem/stud, washers and a nut, which stem/stud is hollow and may contain wires therein;

Fig. 3 is a sectional view of a first embodiment of the present invention, where the cord (not shown) runs outside the connecting

structure;

Fig. 4 is a sectional view of a second embodiment of the present invention with internal wiring (also not shown) running inside said structure;

Fig. 5 is a bottom view of the embodiment in Fig. 4;

Figs. 6 (a), (b), and (c) show a third embodiment of the present invention;

Fig. 7 is a sectional view of a fourth embodiment of the present invention;

Fig. 8 shows a fifth embodiment;

Fig. 9 is the bottom view of the embodiment in Fig. 8;

Fig. 10 is a sectional view of a sixth embodiment of the present invention.

Description of Invention

The principle of performance of the connecting assembly according to the present invention is somewhat like that of a bifurcated rivet. When a bifurcated rivet's two legs are put through a hole of a book and bent outwardly until the rivet's head abuts upon the edge of said hole, the book is clamped tight. Similarly, in the present invention, a connecting stem/stud with butting portion(s) and foldable tabs is used. Said tabs are of a similar function as that of a bifurcated rivet's legs. Folding of said tabs will not only realize a tight fit to prevent said connecting stem/stud from any motion with respect to the base, but also largely simplifies the manufacturing procedures.

Following will be detailed description of all the embodiments according to the present invention.

Fig. 3 shows the first embodiment of the present invention. As is clear from Fig. 3, the connecting stem/stud (1) has no threading portion; neither is there any screw nut. Instead, the stem/stud (1) has a ring bead formed to abut upon the upper surface of said base cover (2), and the lower end of said stem/stud is splitted into a number of tabs, which are folded outwardly to clamp said stem/stud tight to the base (2). As compared with the prior art structures, illustrated in Figs. 1 (a) and (b), the structure of this embodiment has a number of advantages. First, the base is of a lower height, which means a lower centre of gravity; and

then, smaller blanking size is required for the base cover and less material for the base bottom is used. Next, the threaded stem/stud in the prior art is usually made of copper, aluminum or thick-wall pipe, while the stem/stud in the present embodiment can be made of thin-wall seamed pipe, since no threading portion is present. Moreover, in the prior art structures, the stem/stud must have an outside diameter in close tolerance to mate the corresponding holes in the base, the weighting block, the bottom cover, etc. As the weighting block is usually made of cast iron with a casted hole, it is apt to slide to and fro in case of bad mating. In the present embodiment, however, since the tabs at the lower end of the stem/stud are folded outwardly by an air/hydraulic press, in which case the traditional pilot element of a folding tool usually expands the tube end, a tight fit is ensured. Therefore, a much broader manufacturing tolerance is required of the tube and the corresponding holes. Actually, the stem/stud in Fig. 3 can be made with severed margin piping material; and since the stem/stud is very short, any available forming procedures, such as necking, stamping, expanding, etc., can be easily used. Lastly, since pressing and folding procedures are adopted to realize a tight fit, the stem/stud tube is usually deformed and becomes other than round in shape. Thus, the stem/stud is fitted tight in the base and can never be turned.

Figs. 4 and 5 illustrate a second embodiment of the present invention, comprising a stem/stud (1), a base cover (2), a weighting block (33) and a base bottom (44), same as in Fig. 3, and a power cord way (41), which comprises two openings (42) and (43) for said cord to go through, and a washer (5). Same as above, the stem/stud tube is made with severed margin material of thin-wall seamed pipe. Said material is first cut into sections of right length. Then, each section of stem/stud is necked at both ends to form a ring bead in the middle. A third procedure is to stamp a J-shaped canal in the upper periphery of said stem/stud, said J-shaped canal being for a corresponding round protrusion on the inner side of a lamp pipe to slide in to be fixed. A fourth pressing step is to make a number of slits (say, four slits) in the lower portion of said stem/stud tube, to form tabs between each two neighboring slits. The stem/stud tube is now ready for painting or plating. After painting or plating, the stem/stud tube can be inserted through the holes in the base cover (2),

the weighting block (33), the base bottom (44), and the washer (5) for assembly. A folding and pressing procedure will then fold said tabs outwardly to realize a tight fit. If the base bottom (44) is made of sheet steel, the washer (5) can be dispensed with.

A third embodiment according to the present invention is shown in Figs 6 (a), (b) and (c). A corresponding prior art typical structure is shown in Fig. 2, comprising a stem/stud tube (1), a base (2), washers (5), and a nut (31). The lower end portion of said stem/stud tube (1) is machined to form a shoulder and a threaded portion. Fitting is performed by means of screw and nut, still the usual method. In Figs. 6 (a), (b), and (c), a new structure is seen to comprise a stem/stud (1), a base cover (2), two tabs (7) and (8) and two recesses (9), which are formed by punching off part of the tube end. When said tabs (7) and (8) are folded outwardly, as indicated by (7a) and (8a), they clamp tight the stem/stud to the base cover.

As compared with the prior art structure in Fig. 2, the new structure in Fig. 6 is simple and easy to assemble, unlike the stem/stud 1 in Fig.2 which must be cut from a thick-wall pipe and then necked through a pressing procedure and further shouldered and threaded on a lathe. Since the pipe is reduced in diameter, sometimes even a common 18 AWG (American Wire Gage) power cord can not pass through, so that a 20 AWG nickel-core high temperature cord has to be used instead, which in turn increases the cost.

Now in Fig. 6, the stem/stud (1) can simply be cut from a thin-wall seamed pipe. Moreover, there is no strict requirement for the welding seam, since recesses (9) can be arranged where said seam runs and the seam part is actually punched off. After punching to form tabs, said stem/stud (1) can then be painted or plated. During painting or plating, the stem/stud (1) can be thoroughly coated without any protection means to cover a threaded portion, as is the case in the prior art structure shown in Fig. 2. Fig. 6(b) shows a "double-D" hole (10) in the base cover (2) of the new structure. Of course, in case of a pipe with a big diameter, three or more tabs can be formed for a proper tight clamp, in which case the hole (10) will also be correspondingly changed in shape. Fig. 6(c) shows that the stem/stud (1) has been inserted into said hole (10) in the base cover (2), and that the two shoulder-like top edges of the recesses (9) are just resting upon the top surface of said base cover (2), while

the tabs have been folded as shown by (7a) and (8a) through a folding procedure, as described in the second embodiment of the present invention. As compared with the prior art structure in Fig. 2, the pipe in the third embodiment requires only one pressing and folding procedure, and thin-wall seamed pipe can be used instead. There is no need to use any screw nut, washers, etc.. A simple folding and pressing procedure will get the base cover (2) tightly clamped between the top edges of said recesses (9) and the folded tabs (7a) and (8a).

Fig. 7 is an illustration of a fourth embodiment of the present invention, where another new structure is given, comprising a stem/stud (1), same as in Fig. 6, a base cover (2) having a countersink (11) for reinforcement to prevent the stem/stud (1) from tilting or making any sideway motion. This embodiment is particularly suitable for a standard lamp having a long lamp pipe and a base cover made of thin sheet metal or plastics. For this embodiment, if the base cover is made of plastics or other soft metals such as aluminum, etc., it is recommended to use one or two washers of suitable size, so as to dissipate the local stress to a larger area.

The fifth embodiment according to the present invention is shown in Figs. 8 and 9, where a new structure is seen to comprise, besides a stem/stud (1) and a base cover (2), a supporting plate (13), having a formed mating surface and a hole (12) to match the outer surface of extrusion caused by a countersink in said base cover (2). Besides, said supporting plate (13) also has two tapped holes for two screws (15) to screw in, to pull a bottom cover (16) hard against the lower edges of said base cover (2) after said tabs (7a) and (8a) are folded and pressed hard upon the lower side of said supporting plate (13). In this manner, said plate (13) is clamped tight between said base cover (2) and said tabs (7a) and (8a), and stress is dissipated to a very large area.

A similar prior art structure comprises a plate welded to the bottom of a base cover, and said plate has two tapped holes for screws to screw in. Welding is indispensable because the base is usually a sheet metal workpiece made by drawing process, so it is impossible to tap screw holes therein. In the above-mentioned fifth embodiment structure, the countersink in the base cover (2), the hole (12) in the supporting plate

(13) and the plate (13) itself all help towards dissipation of stress. Moreover, the plate (13) is intended to pull the stem/stud (1) hard against the base cover (2); so there is no worry of any part(s) getting loose, as is always the case in a prior art structure.

Fig. 10 illustrates the sixth embodiment of the present invention, where the base comprises two concentric countersinks (11) and (20), respectively. Through a common "double D" hole, tabs (27a), (28a) of a sheath (21) and tabs (7a) and (8a) of a stem/stud (1) are folded to complete assembly. In this case, the stem/stud (1) is further reinforced as compared with the fourth embodiment. If the diameters of the two countersinks (11) and (20) are so selected, such that the outer countersink (20) has a diameter of 12.7 mm, and the inner countersink (11) has a diameter of 12 mm, then the base cover (2) can be used for mating either inch system pipe or metric system pipe. Even if a batch of inch system pipes is mixed with metric system pipes, the mixed batch can still be supplied to the assembly line without any malfunction; after assembly, anyone can distinguish at a glance if the pipe used is of inch system or of metric system. Because when a pipe of metric system is used, there is a 0.35 mm gap between the countersink (20) and the stem (1). And in the following painting process, the gap can be covered by paint and will be no longer visible. In the prior art, however, the stem, the nut, the washer and the hole in the base cover must be either of the metric system or of the inch system, and can never be mixed. If a pipe of a wrong system is supplied, the whole assembly line will have to be stopped at once.

The present invention has the following advantages. First, the manufacturing process is greatly simplified; no lathe working and threading process are required. Instead, only press work procedures are needed. Therefore, materials of low grade can be used, and a broader manufacturing tolerance can be allowed. Next, the number of parts invovled is reduced to a minimum. Further, pipes of inch system and metric system can be mixed in use. Finally, the product of the present invention is more reliable and rigid, cheaper in cost and quicker in production.

What is claimed is:

1. A connecting assembly for fixing the tubular stem/stud of a portable lamp to the base of the same, comprising a stem/stud having two or more symmetrically spread tabs and recesses made at its lower portion, and a base having an uncircular hole made in its top to let said tabs pass through while the top edges of said recesses are abutted upon the top surface of said base;

said tabs being folded outwardly to clamp said base cover between said top edges of said recesses and said folded tabs.

2. A connecting assembly, as claimed in Claim 1, wherein said hole in said base has a surrounding concentric countersink for reinforcing the rigidity of the assembly.

3. A connecting assembly, as claimed in Claim 2, wherein washers can be placed between said stem/stud end and said base cover to dissipate local stress when said base cover is made of plastics or soft metals.

4. A connecting assembly, as claimed in Claim 2, wherein a supporting plate with a formed mating surface and a hole fitting the outer surface of said countersink in said base cover is provided between said base cover and said folded tabs for dissipation of local stress to a larger area.

5. A connecting assembly, as claimed in Claim 1, wherein the top hole in said base has two concentric stepped countersinks with different inner diameters, for a stem/stud and a sheath to be simultaneously inserted, and the tabs at their ends are folded and pressed for better reinforcing the rigidity of the assembly.

6. A connecting assembly, as claimed in Claim 1, wherein the top hole in said base has two concentric stepped countersinks with different inner diameters of inch system and metric system, respectively, in order to receive either an inch system stem tube or a metric system stem tube in one of said two countersinks without any trouble in assembling.

7. A connecting assembly for fixing the tubular stem/stud of a portable lamp to the base of the same, comprising a stem and a base cover,

said stem/stud being necked or ring beaded to form a shoulder for butting upon the top surface of said base cover, and having a lower end splitted to form a number of tabs;

said tabs being folded outwardly, after the necked portion of said stem is inserted through a series of holes, to clamp the respective parts tight between said shoulder and said folded tabs.

8. A connecting assembly, as claimed in Claim 7, wherein said necked or ring-beaded portion of said stem/stud is expanded close to where the tabs are folded by the pilot element of a folding tool to ensure a tight fit.

9. A connecting assembly, as claimed in Claim 7, wherein said stud tube is necked at both ends, having foldable tabs formed at one end, and a J-type canal formed in the periphery of the other end, to mate with a corresponding protrusion on the inner side of a stem pipe.

10. A connecting assembly, as claimed in Claim 7, wherein said tubular stem/stud is a thin-wall seamed pipe.

11. A connecting assembly for fixing the tubular stem/stud of a portable lamp to the base of the same, as claimed in Claim 1, wherein said tubular stem/stud can be a thin-wall seamed pipe other than round in shape.

12. A connecting assembly, as claimed in Claim 7, wherein said tubular stem/stud can be a thin-wall seamed pipe other than round in shape.

13. A connecting assembly, substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

Patents Act 1977
Examiner's report to the Comptroller under Section 17 (The Search Report)

Application number
GB 9300634.4

Relevant Technical fields

(i) UK Cl (Edition L) F2H (HARX, HARP, HASS, HASX, HKX, HL)

(ii) Int Cl (Edition 5) F16B 19/10 HOIR 33/46

Search Examiner
P M WELLER

Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASES: EDOC

Date of Search
26 MARCH 1993

Documents considered relevant following a search in respect of claims 1-13

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
Y	GB 2234797 A - (CENTRAL MOULDING) figure 2	1,7
X	GB 1462107 A - (RANSON) all figures	1,7
Y	GB 0997003 A - (DARE-INGLIS) all figures	1,7
Y	GB 0770363 A - (WING) figure 1	1,7
X	GB 0703034 A - (ITW) figures 3,4	1,7
Y	GB 0679650 A - (ARNOLD) all figures	1,7
Y	GB 0618033 A - (GKN) all figures	1,7
Y	GB 0603984 A - (HALL & KAY) all figures	1,7
X	GB 0512543 A - (MITCHEL) figures 1-4	1,7
X	GB 0491426 A - (UNITED CARR) figures 1,2	1,7

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

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A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

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